



# STATE PREVENTIVE MEDICINE.





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THE FIRST ANNUAL ADDRESS

TO THE

# STATE BOARD OF HEALTH

OF CONNECTICUT,

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"Health is the greatest of all possessions, and it is a maxim with me, that a hale cobbler is a better man than a sick king.—*Bickerstaff.*"

"A change has come over the science of medicine; with true nobleness of purpose, true medicine has been the first to strip herself of all mere pretences to cure, and has stood boldly forward to declare, as a higher philosophy, the prevention of disease. The doctrine of absolute faith in the principle of prevention includes the existence of a higher order of thought, of broad views on life and health, on diseases and their external origin, of death and its correct place in nature. . . . The science of prevention becomes a political and a social, as well as a medical study."—*Dr. Richardson.*

"We stand now at the very dawn of the grandest epoch yet seen in the progress of medicine. While philosophically, accurately, and with the most minute skill studying by means of physiology, pathological anatomy, chemistry, the microscope, and above all, by careful clinical observation, the natural history of disease and the effects of remedies, our art at the present day looks still higher, viz., to the prevention of as well as to the cure of disease. And this is to be done by sanitary organizations throughout each State, the nation, the laity, and the profession heartily joining hands in this most noble cause. If by such means one-third or more of the sickness and the suffering consequent thereto can be averted; if the rate of mortality can be very sensibly diminished, public health everywhere greatly improved, and human life prolonged, 'the glorious triumphs' predicted by Dr. John Forbes, it may truly be said, 'are being achieved.'"—*Dr. H. I. Bowditch.*

"Power can be generous. If our mechanic arts are unsurpassed in usefulness; if we have taught the river to make shoes and nails and carpets, and the host of heaven to write our letters like a Gillott pen, let these wonders work for honest humanity, for the poor, for justice, genius, and the public good. Let us realize that this country, the last found, is the great charity of God to the human race. . . . Humanity asks that government shall not be ashamed to be tender and paternal, but that democratic institutions shall be more thoughtful for the interests of women, for the training of children, and for the welfare of sick and unable persons, and serious care of criminals, than was ever any the best government of the old world."—*Ralph Waldo Emerson.*

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State Preventive Medicine is the now generally accepted term for what has been known as the science of public health, or hygiene. It has received various definitions; that which gives it the widest signification will best express the province which is now generally assigned to it. Dr. Mapothers, an eminent authority, defines it as "an application of the laws of physiology and general pathology to the maintenance of the health and life of communities by means of those agencies which are in common and constant use." Sander, a recent German writer, gives the definition as "the care the State may reasonably be expected to exercise over the health of the individual by himself, and in his relation to the community." Another, which I think better covers the whole ground, and is in part by Dr. Smith of New York, makes it the power to protect the people from pestilence, whether foreign or domestic; to discover and remove the causes of disease within and around their houses, to promote the general health of communities, and plainly to point out the ultimate relation between their physical condition and their moral and intellectual position. State Boards of Health are the executive officers of State Preventive Medicine—or in other words, the machinery by which its principles are applied to practice.

It is not, as is generally supposed, of modern origin, but dates back to remote antiquity. The Mosaic, the most ancient of all codes, embraces the wisest sanitary laws as a prominent part of those given for the religious guidance of the Jewish people. The remains of the aqueducts, sewers, drains, public baths, and street-pavements of ancient Rome, and the traces left in the ruins of private houses, of appliances for ventilation and drainage, many so thoroughly constructed as still to be in excellent preservation, testify to the recognition of the same laws by the Romans.

The laws of Lycurgus, says Dr. Gairdner, are not wanting in many very pointed enactments on sanitary matters; and the importance attached by all the Greek republics and in the ideal Platonic polity, to physical culture, is well known. Thus the Jews, the Greeks, and the Romans, the most manly of all the races of mankind, owed to the temperance and simplicity of their lives and their obedience to the laws of preventive medicine, that vigor of body and energy and decision of mind which made them so invincible in war, so wise, self-reliant, and progressive in all the arts of peace, and gave to each of them in turn the merited and proud rank of the dominant nation of the world. We learn from the Justinian Code that a corps of State Physicians was early appointed in the Roman Empire; there were ten of them in the largest towns, one to each district or subdivision; seven in towns of the second order, and five in the smaller ones. They collectively formed a college, whose duty it was to attend to the public health.

For centuries after the decadence of the Roman Empire, we trace in the history of the world no recognition of the necessity of any sanitary provision. The importance of pure air and pure water, ventilation and drainage, and all the other essentials to health, seemed unheeded. The monk, holding in his watchful and oftentimes miserly keeping the manuscript records of our holy religion, was almost the only one who cared to clothe the naked, feed the hungry, build hospitals for the sick, and dispense sadly needed charity to the poor and suffering. The preacher of righteousness, he was generally also the illustration of personal filthiness. The causes of disease were unknown, and consequently unchecked; and the frequent and terrible epidemics which often more than decimated the nations, were considered special manifestations of the wrath of God. The history of England or of Europe gives little evidence of any material advance in this department of civilization, until the nineteenth century. Up to this time we find only the repetition of the same sad story of sensuality and apathetic ignorance, of cruel oppression and servile submission, of the absence of all human sympathy, and the measureless waste of human life.

In the advance of civilization, England was the first nation to learn that the penalties for all violations of the physical laws are as inevitable as for those of the moral laws; and that all true national progress will be in proportion to the due recognition of each.

The plague, small-pox, fever and ague, on land, the scurvy on ship-board, with other results of the universal neglect of all sanitary care, diminished the national resources and crippled the national strength. She began to realize that pestilence was no more a special visitation of Divine anger than war, and was alike to be anticipated and avoided, or wisely and efficiently met. During the last century something was done in Europe, and more especially in England, to improve the sanitary condition of the larger cities and of the more densely populated manufacturing and agricultural districts. But this, almost the first step in the modern recognition of sanitary science, was tardy and incomplete; its laws were imperfectly understood, and the efforts to apply this scanty knowledge were without intelligent system or efficiency. The epidemic of cholera in Great Britain in the year 1832, in its practical teachings and ultimate results, proved the starting-point of a great advance in hygienic reform. Its distinct and novel selections of certain peculiar localities as the best prepared and fitted for its ravages, its uniformly greater prevalence and fatality among the poor, the degraded, and the filthy, than among those classes where the comforts and the decencies of life were found, its very general avoidance of the latter until it had acquired an accumulated virulence and power by its malignant growth among the former, all united in demonstrating to the government the vital necessity of an immediate and thorough investigation into the causes and possible means of prevention of a pestilence so fatal to national prosperity and life. The right measures were promptly taken. Government commissions were appointed, thorough investigations were made, and the results, carefully and accurately collated, were at once given to the public. The very able and comprehensive governmental report published in 1842 on the sanitary condition of the laboring population of Great Britain, is universally acknowledged to be the true starting-point of modern sanitary legislation. In 1844-6, valuable reports were made by a "Health-of-towns commission," and in 1847-8, reports of a like character by a similar commission. The passage by the British Parliament of the Public Health Act of August 21, 1875, "condensing and amending the previous acts relating to public health in England," is considered by Dr. Bowditch (*our* highest authority) the most important enactment of any nation in modern times.

These reports were the results of the oftentimes imperfectly appreciated or compensated labors of a few earnest men. In this

connection, the names of Mr. Simon, Thomas Chadwick, and Dr. William Farr (the celebrated Registrar-General of Great Britain), have especially become historical. Of the latter gentleman, Dr. Gairdner, himself of the highest authority, writes: "He found the facts of this science in a state of almost hopeless and aimless confusion, and has not only added immensely to their number and value, but has brought into them light, harmony, and order, and for the first time in the history of the science, a determinate method and an approach to scientific exactness; by his system of calculating death-rate, he has given his professional brethren an easy and useful method, and by the formation of life-tables, he has greatly facilitated the operations of life insurance." I quote this tribute to the labors of Dr. Farr, as in the great work before us it will be cheering to know the origin of the pioneer work so helpful to our own present necessities and progress. These details of that efficient combination of individual and legislative instrumentality to which we owe the great advance of sanitary science in Great Britain, as well as the increasing interest in sanitary reform throughout Christendom, will illustrate the important truth, that it is only through this union of the action of the people and the legislature, that these results, so essential to the highest civilization, can be obtained.

On the continent of Europe sanitary science is exciting much interest. The governments of most countries, especially of France, Germany, and Italy, are recognizing its national importance by official action. And governmental agency sustained by that of individuals, humane societies, and scientific associations, is giving the best promise that this great reform, so prominent in its importance, so far-reaching in its aims, so necessary to individual welfare and to national prosperity, is about to be accepted as a vital factor in the progressive civilization of the age. These claims for its high merit will not seem extravagant or unreasonable to those who have studied its obtainable results.

In this country, Massachusetts, as often in other questions of public utility and advancement, took the lead in establishing in 1869 the first State Board of Health in the United States. The history of that board is instructive. In the year 1850, Lemuel Shattuck of Boston, made a report to the legislature of Massachusetts on sanitary reform, which showed singular foresight and wisdom, but was so far in advance of his times that, as Dr. Bowditch remarks, "it fell still-born from the press." It was, how-

ever, good seed, buried, but not dead. Twenty years afterward, through the enthusiastic and untiring efforts of Dr. Bowditch, seconded by the energetic aid of Dr. Jarvis of Dorchester, and the Hon. Thomas F. Plunkett of Pittsfield, and others, the good seed bore this good fruit—the first American State Board of Health.

It is not, I trust, tracing results back to a too remote cause, if I add that Mr. Shattuck's report also gave its inspiration to the first report of the Massachusetts Board; which was from the pen of its first secretary, the late lamented Dr. George Derby of Boston,—a most able and influential document which gave a new impulse to hygienic reform, and still remains a text-book and model for us all. The annual Reports of the Board of Health of this our neighboring State have been continued regularly since 1869. They embrace the results of extensive and careful investigations into the various departments of public health, and, like the Privy Council Reports of Great Britain, form an invaluable library of reference for the help of those who are following in the path they have pointed out. The last annual report of the Massachusetts Board (for 1878), contains an important paper upon "Drainage and Health, Sewerage and the Pollution of Streams, including the draft of a Law,"—a document which gives us the result of the examination made upon these subjects by a special commission of scientific and practical men appointed by the governor of the State. This commission spared no needed time, labor, or expense; their investigations were sharp and thorough; they reached every city, and nearly every town in the State; especially every locality where they found any unusual prevalence of sickness, increased death-rate, any suspicion of sanitary neglect, or any complaint of sanitary defect or nuisance. Their report accepted by the Legislature, and sanctioned by the highest legal authorities of the State, must have great weight everywhere, especially in aiding the adjustment of the difficult, embarrassing, and conflicting claims of rights, privileges and long-time uses connected with ponds and water-courses. The increasing density of our population in city and country, and the extension of manufacturing establishments of various kinds, give an increased importance to the question, how far *any* interference with the purity and the domestic uses of water can be considered equitable or legal. The report we refer to, liberally illustrated with maps, plans, sketches, etc., is justly considered exhaustive. The valuable mass of facts and suggestions to be found in the series of reports of the Massachusetts Board is in

that higher line of political economy, which is sure to lead a State to increased power and wealth.

Here, as in England, the most efficient of the pioneers of sanitary reform were not from the active members of the medical profession, but from the laity. What Mr. Simon and Thomas Chadwick have been, and, happily, still are to this cause in England, Lemuel Shattuck has been in the United States. Most ably and earnestly have these leaders been seconded by the medical profession in both countries. Thus we see that this is not a subject of limited and exclusive interest, or dependent solely on the aid and sympathy of any class, for its successful inauguration or progress. It is eminently a work for the coöperation of many allied forces; the profession and the laity; the individual and the State. In this alliance alone can success be obtained; in this, it is certain.

We find one of the good signs of the times in the rapid and widespread interest in sanitary reform, which has of late been developed in nearly all parts of the United States. State after State has caught the salutary influence of the example of Massachusetts; leading men, especially in the medical profession, are giving it their active support; the people at large are beginning to recognize the safer, better, and cheaper policy of prevention than that of the cure of disease, and to understand that the causes of many of the most dangerous diseases are palpable, easily recognized, and easily avoided.

It remains for Congress to recognize the importance of this subject, and make the "Health Department" a function of the National Government; as it is only through a united and organized system that the best national results are attained.

A Department of Public Health, with a well-defined code of sanitary law, will be established when the people appreciate its far-reaching influences; that both disease and crime come from the same tap-root of pauperism which naturally springs up from the subsoil of filth and unsanitary conditions underlying all, and involving other interests than those simply of physical health. We can see no reason why a public alarm should not be as quickly given for an outbreak of epidemic disease as for an outbreak of fire, and as thorough an organization be provided to meet the one as to combat the other. It is simply the larger application of the common-sense system of prevention. We accept the axiom of military men, that the power of an army is in the health of the soldier, and though the calls for active service are brief, and it is

to be hoped at increasingly long intervals of time, it is the accepted duty of the Secretary of War to keep up the discipline and efficiency of the army at all times. "The fighting time for which a Secretary of Health and his organization would have to prepare is daily and continuously. It would be with him as if an invading enemy were constantly to be met, and every year a great battle was to be fought."\* At the present time civilization is fighting these battles all over the world, and for the most part losing them, as in that unobstructed invasion of Great Britain in 1832, by cholera, which proved so destructive of life and property, and also as, during last summer, when yellow fever found free admission to our principal southern port without inspection or quarantine. That fever, once admitted, found in the accumulated filth of city, town, and country, such an abundant material for the reception and development of its poison-germs as to defy all prevention or remedy. The consequent loss of life is counted by thousands, the loss of property by millions of dollars; the desolation of households, the consequent suffering, etc., cannot be measured or counted. Cholera has of late years repeatedly visited the ports of Great Britain, and sanitary regulation has restricted it to the infected vessels. Sanitary science claims that the due enforcement of its laws, thorough, rigid quarantine, and other precautions, can prevent the importation of any epidemic disease, or limit its ravages, and thus avert such fearful waste of life and property.

Having given the accepted definitions of the science of State Preventive Medicine, and a brief sketch of its rise and progress, we are brought to the questions, What are the specific duties it prescribes? What loss has been sustained by their neglect? What has it already done? What more does it propose to do? and What are its reasonable possibilities in the future?

We have seen that this science was ancient in its inception, and, though long dormant, has of late begun to obtain due recognition of its momentous importance, ranking among its numerous friends and advocates an increasing number of eminent statesmen, scientists, and philanthropists, and in all civilized countries, moreover, winning to its cordial support many who, from an honest misapprehension of its character and aim, were for a time indifferent or opposed. It now comes before us, claiming the power to prevent disease, prolong the duration of human life, and, in its ultimate reach, to increase the well-being and happiness of the nations. This it seeks to do

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\* Dr. Farr.

by giving a higher aim and efficiency to the powers of civilization through the removal or diminution of evils which now deteriorate the race or hinder its progress.

The duties it prescribes are well defined in the succinct language of the Act creating this Board:

"The said State Board of Health shall take cognizance of the interests of health and life among the people of this State; they shall make sanitary investigations and inquire respecting the causes of disease, and especially of epidemics, the sources of mortality, and the effects of localities, employments, conditions, *ingesta*, habits and other circumstances upon the public health; and they shall collect such information in respect to these matters as may be useful in the discharge of their duties, and contribute to the promotion of health and the security of life in this State; they shall cause to be made by their Secretary, or by a Committee of the Board, inspections at such times as they may deem best, and whenever directed by the Governor or the Legislature, of all public hospitals, prisons, asylums, or other public institutions, in regard to the location, drainage, or water-supply, disposal of *excreta*, heating and ventilation, and other circumstances in any way affecting the health of their inmates, and shall also suggest such remedies as they may consider suitable for the removal of all conditions detrimental to health."

These duties are also marked out by Cameron as "mainly to procure supplies of pure water, to prevent the pollution of air and water by foul liquids, gases, vapors, and dirt of all kinds; to prevent over-crowding of dwellings, to see that the houses of the laboring classes are in perfectly tenantable order, to check the sale of adulterated, diseased, or otherwise unsound food, to cleanse the streets and roads, to prevent the spread of contagious diseases, to bury the poor, to provide burial places for rich and poor, and to disinfect and to provide dwellings for artisans." The German code is still more minute and comprehensive.

It is meant, furthermore, that the best knowledge bearing upon the illustrations and teachings of this science, and upon the legislative action necessary for its furtherance, shall be published in a plain and economic manner, and be freely distributed throughout the community, in order that the people may be educated in respect to the nature and causation of diseases, the means of prevention, and generally the danger of ignorance, neglect, or disobedience of the laws of hygiene." This diffusion of

knowledge is truly the first and gravest duty of all; other measures following in due course the right discharge of this primary duty. In the words of an eminent English statesman,\* "No sanitary improvement worth the name will be effective, whatever acts you pass, or whatever powers you confer upon public officers, unless you can create an intelligent interest in the matter among the people at large. The State may issue directions, municipal authorities may execute to the best of their power, inspectors may travel about, medical authorities may draw up reports, but you cannot make a population cleanly or healthy against their will, or without their intelligent coöperation. . . This is why, of the two, sanitary instruction is even more important than sanitary legislation." At this time, when so many schemes of reform and philanthropy (falsely so-called), are dinned into the public ear, any new claim, urged not only on the people but on the government of the State for adoption and support, should of right be submitted to the sharpest scrutiny, and to the rigid requirement of satisfactory evidence.

Dr. Richardson says : † "I want strongly to enforce that it is the section of the nation which Dr. Farr classes as the domestic—the women—on whom full sanitary light requires first to fall. Health in the home is health everywhere; elsewhere it has no abiding place. I have been brought indeed by experience to the conclusion that the whole future progress of the sanitary movement rests for permanent and executive support on the women of the country. When as a physician I enter a house where there is a contagious disease, I am, of course, primarily impressed by the type of the disease and the age, strength, and condition of the sick person. From the observations made on these points I form a judgment of the possible course and termination of the disease, and at one time I should have thought such observations sufficient. Now I know them to be but partly sufficient. A glance at the appointments and arrangements and management of the house is now necessary to make perfect the judgment. By this glance is detected what aid the physician may expect in keeping the sick in a condition most favorable for escape from death; and by this is also detected what are the chances that the affection will be confined to

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\* Lord Derby.

† Address on the "Future of Sanitary Science," before the Sanitary Institute of Great Britain, July, 1877.

one sufferer or distributed to many. As a rule to which there are the rarest exceptions, the character of the judgment is hereupon dependent on the character of the presiding genius of the home, on the woman who rules over that small domain. The men of the house come and go; know little of the ins and outs of anything domestic; are guided by what they are told, and are practically of no assistance whatever. The women are conversant with every nook of the dwelling, from basement to roof; and on their knowledge, wisdom, and skill the physician rests his hopes. How important, then, how vital that they shall learn, as a part of their earliest duties, the choicest sanitary code."

As a timely illustration of the correctness of this judgment, I may be permitted to state, on the authority of Dr. Bowditch of Boston, that the movement which resulted in the establishment in Massachusetts of the first Board of Health in the United States, originated with a lady of Pittsfield, (Mrs. Thomas F. Plunkett,) who had been intimately connected with the Maplewood Seminary in that town at the time of the well-known outbreak of typhoid fever in that institution, and was an intelligent observer of those violations of sanitary law which led to such disastrous and fatal results.

In fairly measuring what sanitary science has done and can do for the people, we are to take into consideration all those powers, values, and, indeed, sympathies, which are the real vital elements of the State, and which must exist in due proportion to make the best whole. We are also to take the right estimate of another element of public or State property, whose full measure of worth political economists have only of late been ready to admit, the money-value of each healthy life, acknowledging the soundness of that axiom of finance as well as of political economy, that public health is public wealth.

In their best conditions, air, water, food, clothing, house construction, drainage, and more indirectly soil and climate, each with individual importance and mutual relation, are positive factors of the best health assurance. This is demonstrated by that which is the ultimate standard and measurement of sanitary results,—the diminished death-rate, that diminution being in due proportion to those best conditions. In further illustration of these measurements, let us compare the sanitary condition of the people of England in the last century with that of the present time; the utter neglect, then, of drainage, sewerage, and ventilation, of the importance of purity

and plenty of air and water, of personal cleanliness, of the removal of filth accumulations, with badly-constructed dwellings, poor and insufficient food and clothing, all leading to their natural results in the frequent recurrence of zymotic (epidemic and contagious) diseases, and the unrestrained prevalence of all other forms, with a corresponding death-rate of about 1 in 23, against about 1 in 40 at the present time; the death-rate being at all times the most reliable floodmark of diseased conditions.

To-day, by the establishment of government boards, and the employment of able and learned men as the inspectors, "full," as Dr. Bowditch says, "of the enthusiasm and accuracy of modern science, England has made an immense stride towards having a perfect system of sanitary guardianship of the realm." The reports of her unrivalled system of statistical investigations enable us to measure, with a good degree of precision, what State Preventive Medicine has already accomplished there. In all the conditions above specified, especially in regard to the removal of filth, and in the recognition of the fact that the germs of vice, as well as of disease, are developed from filth, extraordinary advances have been made. Epidemics and contagious diseases have either been prevented or kept within narrow limits; some diseases have disappeared, and the frequency and fatality of others have been largely diminished. Consequently the general death-rate has fallen to a much lower figure. Of course, these conditions are not universally regarded; in many locations are found over-crowded dwellings, an abundance of filth and vice, and the neglect or defiance of all sanitary law, and, consequently, in such places there is no diminution, but an increase of sickness and of the death-rate,—the difference in the latter between the most healthy district and the least, in the same city, varying sometimes from twelve to fifty, or even sixty in 1,000. Mr. Chadwick\* says: "We have gained the power of reducing the sickness and death-rate of the old cities by one-third; . . . the death-rate in the old settled country districts to 16 or 17 in 1,000; . . . in the new districts, with complete systems of water-supply, drainage, etc., to less than one-half, or a mean rate of 10 to 1,000, and of sickness in due proportion in both; . . . in prisons and other places under sanitary control, and in the large collection of indigent and dependent children in schools and insti-

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\* Paper read before the British Social Science Association in 1877, on the chief results of the progress of Sanitation.

tutions, to 3 in 1,000, or one-third of the death-rate prevalent among the general population of the same ages, while fully one-half of the diseases of the pulmonary organs in the general population may be prevented by public sanitation." Mr. Chadwick also enumerates many other points of gain and advancement. The result of these national reforms is an equal advance in the material, financial, physical, and moral power of the whole kingdom; a striking illustration of the correctness of the accepted axiom that the health of the people is the first object of good government.

We have thus dwelt upon what has been accomplished in England, because the admirable reports of the British Parliament are unrivalled in their thoroughness and fullness of detail, as well as soundness of conclusion, and are our best instructors and guides. But sanitary reform embraces a wider field; it has availed itself of the researches of science to teach us the quantities and the qualities of air demanded by the best sanitary conditions; its impurities, their sources, and the means of their detection and avoidance, as in proper heating and ventilation, and the intimate relation of these deficiencies and deteriorations to various diseases, especially in the necessities of tenement-houses, prisons, mines, schools, the rooms of the sick and the poor, the workshops of the various trades, and all places where any impediment exists to the free circulation of pure and dry air, as in rooms occupied by many, or by laboring or diseased persons.

As an illustration of these positions, Dr. Carpenter has shown that the fatality in the well-known Black Hole in Calcutta, in the prisons in which the Austrians were confined after the battle of Austerlitz, and in other well-known instances, was not caused, as has been generally supposed, by the excessive generation of carbonic acid gas, but by the "poisonous agency of the organic matter always found in air rendered fetid by the prolonged respiration and cutaneous exhalations of a crowd of human beings, and by the deficiency of the oxidation, and the consequent increase of putrescent matter in the body." It has been shown that consumption often has its origin not only from continuous exposure to dampness of the air, but also from air rendered impure by other, even healthy, persons occupying the same close or unventilated room, or, what is still more dangerous, sleeping in the same bed or bedroom with a consumptive patient; for it is admitted that the air of a close and crowded room may be as effectually poisoned by

the prolonged respiration and cutaneous exhalations even of persons in good health, as by the introduction of sewer-gas.

The specific poisons (whatever may be their ultimate form) of small-pox, typhus and scarlet fever, measles, and diphtheria, yellow fever, etc., pass off into the air and are thus diffused and communicated. Dr. Parkes, speaking of the organic substances floating in the atmosphere, and giving rise to a large class of diseases, says "that it remains to be decided in what exact condition this organic matter exists, . . . whether it is always contained in the substances discharged or thrown from the body as in small-pox, or is produced by putrefactive changes in these discharges, as is supposed to be the case in cholera and dysentery. . . . This much is known, that they differ in the readiness in which they are rendered harmless. While typhus and Oriental plague throw off a poison which, if there is due ventilation, is readily destroyed, the poison of small-pox and scarlatina spreads in defiance of free ventilation, and retain their virulence for months." It is accepted that the air fouled by these germs of disease is the agent of their communication. The researches of science have also taught us that the water-supply demands equally careful scrutiny in regard to its purity and the abundance of its sources, whether from rain-falls, rivers, springs, or wells; the limit within which organic matters may safely be held in solution; the character of the matters thus held; the quantities necessary to be supplied for various domestic uses, cleanliness and sewerage; impurities and their origin, and the increasing danger of the pollution of any source of water-supply by the filth from privies, sink-drains, cesspools, barnyards, leaky sewers, slaughter-houses, and especially of rivers and ponds from direct sewer openings, and the deposit therein of poisonous, noxious, or polluting refuse from many manufacturing establishments.

It has been proved that any continued poisonous agency in a dwelling-house, for instance, an amount of sewer-gas so small as not to be perceptible to the ordinary sense of smell, or the use of well water poisoned by infiltrations from neighboring sinks, drains, privies, cesspools, sewers, etc., in so small a degree as not to affect its taste or relish, or apparent purity, may acquire such an accumulative power as ultimately to produce deleterious or even fatal effects, especially upon children and delicate or susceptible adults.

Another most important hygienic advance is the cognizance of the sanitary as well as moral evil influence of badly-constructed

tenement and other dwelling-houses of those classes whose poverty compels them to seek the lowest rate of rent. Chambers says "that there can be no doubt that the frequency and fatality of epidemics of the middle ages were in a great measure due to unhealthy habitations; the houses were often closely packed in crowded streets, and were often built for the purposes of defense and at a sacrifice of ventilation, drainage, and light. At the present time, with all our boasted civilization, the dwellings of the poor, in our large cities, towns, and villages, are too often a disgrace to humanity." Both in this country and in England, benevolent individuals (as well as some landlords, with a view to safer investment), have, of late, erected dwelling-houses for the poor in which the hygienic conditions of ventilation and drainage, air, water, and space, with all possible *sunlight*, dryness, and consequent cleanliness, are made to combine with rigid regulations, low rents, and unvarying promptness of payment. It is cheering to hear that an extension of this scheme is under the united consideration of wise and benevolent capitalists, and some of our most intelligent architects. It is claimed that the poor can be provided with sanitary habitations at no higher rent than they are now compelled to pay for garrets and cellars. The problem to be worked out is to construct dwelling-houses containing the best combination of domestic necessities, security of physical and moral health, cheapness of rent, and soundness of investment.

New light is also being thrown continually upon the relation between disease and other agencies, such as those of soil and climate, in the direct and marked effect of dampness, and low and circumscribed localities, especially in the development of consumption, and of the cutting down of forests and belts of trees, and the breaking up or change of the surface of the ground, in the prevalence of malarial epidemics. The recent literature of the science is full of illustrations of the newly-discovered power of these, and of many other large, though less influential agencies.

It is evident that to measure aright what State preventive medicine has already effected, we must add to the money-value of the lives which the accurately measured death-rate proves to have been saved by its agency, the amount saved by the diminution of expense of sickness, and that gained by the relief from suffering, and the prolongation of a healthy life, provided we can find any due exponents to express such values. When we thus review what sanitary science has already done in the better instruction of

the people, as to the causes and the often easy means of prevention of disease in general, and especially of the national calamities of epidemics, in the decrease of sickness and its cost in money and suffering, and in a large diminution of the general death-rate, we may well be surprised at the opposition it has ever had to encounter. We look forward to the greater work it has yet to perfect, and fear that the general acceptance of its teachings, which is sure by and by to come, will demand, as in the past, the needless but terrible lessons of such epidemic visitations as the plague, cholera, yellow fever, small-pox, typhoid fever, scarlatina, diphtheria, diarrhœa, dysentery, and also the various forms of cattle-disease, to teach us by loss and affliction, that sanitary reform, in its medical, legal, and economic affinities, is as nearly allied to Christian duty as to political economy. We shall learn that it is no greater violation of the law of God to permit open-faced vice and crime to degrade the moral sense of a neighborhood than to suffer an undrained, ill-ventilated, densely and foully crowded tenement-house to propagate disease among its inmates; that the laws of heredity are not limited to the continuance of physical disorders alone, but that pauperism in the parents as naturally leads to vice and crime in the children as to disease; that moral and physical evils are alike transmissible, and may and do pass down by a well-known law of inheritance from generation to generation.

The term "State preventive medicine," in its right sense, has a wider range than is generally accepted. It is by no means limited simply to the relation of filth to disease. Ruskin founds the strongest arguments in its favor upon the axiom, that "whatever increases the length of life, increases public wealth; whatever improves health, improves morals." The moral, intellectual, and physical natures of man are of near kindred, and of mutual dependence; the ebb or flow of each alike moves the other. Especially is this seen in the connection between the sanitary condition and that trinity of evil sequences,—pauperism, vice, and crime. This relationship, in its far-reaching results, is to-day the gravest and most difficult question before the friends of good government and social progress.

I accept the distinction between honest poverty and pauperism. "The poor we have with us always," and Christian charity accepts the implied obligation in behalf of those who need our aid rather through misfortune than through their own fault. Pauperism is in chronic alliance with indolence and vice. Filth, prolific as it is

of evil, yields the place of preëminence to pauperism; for, in some of the older cities of Europe, filth, in some quarters, appears to be almost the normal condition, without the seemingly inevitable sequence of epidemic disease.

When the Commonwealth charged this Board to take cognizance of the best interests of the health and life of its citizens, it simply expressed a broader recognition of that accepted duty which has heretofore led it to pass and enforce laws for the protection and advancement of their moral, intellectual, and material as now for their physical benefit. It wisely establishes and supports a system of public education, indorses the departments of police and fire, regulates the movements on our railroads and highways, and, in short, reaches out its paternal carefulness (though not always in the highest wisdom) in a multitude of ways; but while doing all this, it suffers our streams and water-supplies to be polluted, does not compel vaccination, and suffers children and others from families infected with diphtheria, scarlet fever, and other contagious diseases, to enter our public conveyances, churches, schools, and social meetings, without hindrance, ignoring the fact that the infinitesimal germs of disease may not only be communicated by contact with a diseased person, but conveyed by the clothing, and retained by the furniture of the sick-room; and tolerates, in the very heart of our cities, open sewers with obstructed flow, whose consequent settlement and putrefaction give rise to deadly miasms! In brief, we suffer pestilence to contaminate the air we breathe, and the water we drink; to walk our streets and enter our dwellings not in darkness only, but at noonday, and this without fear or protest; while we make careful provision for the alarm of the locomotive whistle and the fire-bell!\*

The prevention of indiscriminate charity also has to do with the science whose vital importance I am urging. Alms-giving at the door, in the street, or elsewhere without accurate knowledge or concerted action, is a prolific source of pauperism and crime. It discourages honesty and industry, and offers a premium to indo-

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\* A recent act of Parliament gives the largest cities of Great Britain power to take possession of unhealthy localities and dwellings, etc., to insure sanitary conditions. It is high time that every large town and city should have the legal power to protect the health and business of its citizens, not only by the abolition of those plague-spots so often found where disease as well as pauperism, vice, and crime, is freely generated, but by the isolation or quarantine of contagious diseases.

lence and vice. It multiplies the already large and formidable array of beggars who are at war with work and wages, and feeds a host of vagrant children suffered to be destitute of the educational, moral, and religious influences of healthy homes, leaving them to the successful training of the squad-drill of the street for the higher grades of evil doing—the boy for bolder violations of law, the girl too often to recruit the ever open ranks of prostitution, that social evil whose revenges though secret are no less terrible, reaching as they sometimes do, to the “third and fourth generation.” Another example is the tramp whose outrages upon persons and property,—some of which through the fear and shame of the sufferer are never proclaimed,—have made the revolver almost a family necessity in many outlying and thinly peopled districts.

In this connection, and alike pressing upon us, come the grave questions regarding the sale of the ballot, the safe working of free suffrage, the equitable adjustment of the rights of labor and capital, and communism, which is well defined as the political expression of irreligion, and, it may be added, of uncompromising hostility to republican government, for it is evident that the fires of the Tuilleries and Pittsburg depot were lighted by the same torch and have the same significance. All these forces of social and political disturbance unite to foster antagonism of classes, and to destroy the natural kindly sympathy and the duly recognized dependence between the rich and the poor, the consumer and the producer. Communism does not originate from unsanitary, but from far deeper and more perilous conditions; yet it finds its recruits and most reckless supporters where sanitary reform is most needed. Many political economists, apparently wise and far-seeing, are of the opinion, that we may more safely ignore fire, pestilence, or even war, than these combinations in their far-reaching and disastrous results. Thus we see that state preventive medicine is neither a professional hobby used to carry out some theory of local and doubtful utility, or to advance any narrow personal ambition, nor is it a universal panacea by which all the evils of our social system are to be remedied. It seeks the common-sense application of scientific and practical knowledge to the prevention or removal of evils, needlessly, yet really growing out of an advanced civilization with increased density of population, diminished simplicity of living, larger factitious wants, and undue excitements. It is in these

conditions evidently that the gravest problems of the coming years are involved.

The history of some of the most destructive of the Zymotic diseases strikingly illustrates the demands of preventive medicine.

Leprosy was so prevalent in England during the middle ages as to require a hundred regularly established Leper-Houses for its isolation. This loathsome disease is now to be met with in many countries, and its extension is prevented only by its rigid seclusion.

Scurvy is another of the destructive diseases of early times; it comes from privations and poor food, and has prevailed in armies, besieged cities, and especially on ship-board. Its ravages in former times "were most appalling, and it is estimated that more seamen perished from scurvy than from all other causes combined, whether sickness, battle, or tempest." It is said that in one year 10,000 sailors, in the navies of Great Britain, perished from this cause. Good food, vegetables, fruits, and especially vegetable acids, were found to be absolute preventives. It has, of late, again appeared, not only in the English merchant service, but on board one of the Northern discovery ships, from the culpable neglect to provide a sufficiency of these simple but effectual remedies.

The plague, a malignant kind of contagious fever, well termed one of the great historic scourges of mankind, has again appeared in Europe. This disease, historians estimate, has destroyed, during the past centuries, over 25,000,000 of human beings. It is supposed to have originated in China; under the name of the Black Death it spread through Asia and Europe in the 14th century, and invaded England in 1663-5. As late as 1720 it destroyed half the population of Marseilles, and, about 1790, prevailed extensively in Russia and Poland. In 1665 the Great Plague, so graphically described by De Foe, destroyed nearly 80,000 people in London; there, as elsewhere, its ravages were unchecked; its progress was marked only by the sign of the Red Cross, and the inscription, "Lord have mercy upon us," over the doors of the infected houses, and by the cry, "bring out your dead," as the carts went from street to street collecting the death-toll of this fearful pestilence. Like a fire on the prairie, it died out for want of material to feed upon. Sanitary precautions were unknown. Its recent invasion of Europe comes naturally in the train of the privations and sufferings of war. Unknown and unlooked for by the ignorant local authorities, its first developments were unheeded. As soon

as it was recognized, the Russian government applied energetic sanitary treatment. Scientific health-commissions with plenary powers were created, rigid inspection and quarantines were established and enforced by a cordon of troops, and infected houses and their contents were burned. Austria, Germany, France, and England have taken the alarm, and consequently all the allied forces of State preventive medicine are being arrayed against the progress of this most formidable enemy. The contrast between the passive and ignorant surrender of the olden times, and the efficient and intelligent opposition now made, is a striking instance of the progress of Sanitary Science.

I have alluded to the ravages of cholera in England, in 1831-2, and the consequent investigations of the government. It was found that in the *fully developed* cases of this formidable disease "our utmost power over it, is some little ability of palliation, yet, in contrast with the powerlessness of curative treatment, the power of preventing it is about the happiest possession of science.\*

Edwin Chadwick, Esq., of London, in his address before the International Congress of Hygiene of Paris in August, 1878, says:—"At the Congress of Hygiene at Brussels, a paper was given by Professor Zidekauer, consulting physician to the Emperor of Russia, in which he compares the results of the old medical treatment used in St. Petersburg during the three successive attacks of cholera in 1836, 1848, and 1855, with our system of dealing with the premonitory symptoms, which they carried out closely and satisfactorily in 1866. In the first three attacks there were not less than from 47,000 to 50,000 individuals struck with cholera, of whom not less than from 23,000 to 25,000 died, that is to say, fifty per cent. In the epidemic of 1866, from 57,000 to 60,000 inhabitants were affected with premonitory symptoms, who received immediate relief; but only 15,000 had developed cases, of whom only 3,000, or about five per cent. died. This I submit as a fair result of our system."

Small-pox is well characterized as the most loathsome and destructive pestilence that ever existed, its victims being a hundred to one that perished by the plague. For years preceding the discovery of vaccination its victims were estimated at not less than 500,000 annually in Europe alone, with one-half its present population, and those it did not kill were often deformed. Vaccination has added three years to the general average of human

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\* Dr. Parkes.

life all over the world, and when duly enforced, and with the use of purely bovine matter, and with due seclusion and restriction of imported or sporadic cases, this disgusting disease can be as effectually extirpated from the civilized world as scurvy or leprosy. Yet by the neglect of vaccination, isolation, and all due sanitary measures of prevention, no less than 51,034 died in Great Britain from small-pox in the ten years 1856-1865, and in the year 1864 alone the deaths were 9,425.\*

In a paper read before the American Public Health Association in 1876, Dr. Lee of Philadelphia, gives an approximate estimate of the loss sustained by the city of Philadelphia from the presence of small-pox in the winter of 1871-2. This includes the loss by diminution of travel and traffic of railways, etc., in and out of the city, loss to inn-keepers, retail dealers, merchants, manufacturers, travelers, customers, shipping interest, laborers, etc.; and in addition to this, the value of the loss of life, loss of labor, and cost of sickness in the 25,000 cases of disease. He makes the tax thus imposed upon the city of Philadelphia to amount to not less than \$24,000,000.

In 1871-72, through similar violation of sanitary law, small-pox prevailed as an epidemic in Boston and Lowell. Over a thousand lives were heedlessly sacrificed, besides the corresponding money-loss.

In these and all preceding estimates, no attempt is made to measure the consequent suffering and burden of orphanage and widowhood.

Insanity is strictly a physical disease, and comes eminently within the range of preventive medicine. When our proposed system of State sanitary registration and report is carried out, and each case is reported in its earlier stages, we may hope to obtain a more accurate knowledge of the predisposing and exciting causes of this flood of mental disorder which is filling our lunatic hospitals faster than we can or do build them. We can also more efficiently apply the means of its prevention and remedy, when we can better measure its varied pernicious causes, such as erroneous educational and social influences, neglect of family training to reverence and obedience, sensational reading, evil habits of body and mind, and idle, aimless, or sensual lives, and learn more exactly as we shall surely learn, how very early in life the predisposing causes of insanity are planted in the child. In view of the relation of insanity to general hygiene I

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\* Chambers' Cyclopaedia.

may here present the proposition that as the healthy brain-cell is to the best mental action, so is the right sanitary home to the highest physical social life. In no department of philanthropy and science during this 19th century, has greater progress been made than in the direction of the better care and treatment of the insane. Their condition in the last century is well described by a quaint old Scotch writer who says, "the better sort of ye mad people we leave to the care of the Chirurgeon, the baser sort to the taming of the scourge." Fifty years ago only half a dozen lunatic hospitals, and all of limited capacity, existed in the United States. To-day there are over eighty with most liberal provision for their 30,000 inmates. A greater work remains to be done, a work greater than cure or kindly care—that of prevention; a work which, in order to be of the highest success, must reach back often to the early life, the family, the school, and the nursery.

The question before us to-day is, not only what can the State do for the chronic insane; but the wider and more timely question, how can we prevent insanity?

In my report for the Retreat for the Insane for 1860, I said: "Over three thousand cases of insanity have now come under my direct observation and care. In a large proportion of those whose histories I could obtain, I have found that the remote and predisposing causes of insanity could be traced to malign influences on childhood." The neglect of physical training, and the imperfect physical development which follows from this neglect, are strikingly evident in many of our female patients. The various causes which are reported to me as the sources of disease, and which are classified in the tables under the head of "ill health," "undue mental effort," "grief," "domestic unhappiness," etc., may very frequently be traced, in their primary influences, to the one cause of a want of physical stamina. We press the training of the mind, by all possible hours of study in and out of school, and by the added stimulus of emulation, while we neglect the training of the body, in disregard of that mysterious but absolute law of sympathy, which compels the debility of the latter to cripple the action of the former. My own observation leads me to think this error will be found to exist more frequently with the parents than with the more intelligent and advanced of our teachers; and its pernicious tendencies are beginning to be better appreciated. "I venture to say that not one girl in ten, now-a-days, enjoys really sound, rugged health; and surely that is a very unwelcome state-

ment about those who are expected hereafter to be helpmates to husbands and mothers of children. . . . Parents and teachers both should inculcate upon children of both sexes, the importance of health-bringing, active exercise. Boys need but little urgency, but girls should be compelled to take it. It *is possible* for them to become of strong, vigorous health, with excellent digestion, and no nervousness.\* "

In my report of 1840, I stated that, of the female patients admitted during the past three years, thirty-four per cent. were the wives of farmers and mechanics—an undue proportion of the comparative number of these classes in the community. The consideration of the causes which led to this most natural result, showed that between child-bearing, nursing, the accumulation of household duties and drudgery, and the miserable short-sighted economy which often led the husband to refrain from supplying the necessary domestic assistance, the poor discouraged wife lost in turn her appetite, her sleep, and her strength; her nervous system had become prostrated, and, sinking under her burdens, she had sought refuge in the Retreat. One of our worthy female patients remarked one day to a lady, "Only think of it! they are keeping me here, and I have six children and fourteen cows to take care of at home." "Twenty excellent reasons for your remaining here until you are cured," was the timely answer. They were the twenty reasons which had made her insane. Certain it is, that a decided majority of all the cases of insanity which have come under my care during the past forty years, have arisen from easily avoidable causes, and might therefore have been as easily prevented.

The laws of heredity are not limited simply to the transmission of disease; drunkenness, idleness, pauperism, vice, crime, come under the same laws, and may be alike propagated from parent to child; and by a well known law of sympathy, each one of these often draws most of the others in its train of consequences, all leading directly to the deterioration of the race.

On the other hand, and in direct opposition to this result, we find that the sanitary law of prevention which enforces the removal of those causes of loss, evolves the healthy body and healthy mind, and that marvelous power of the will over not only the insane impulse but over all those other disordered impulses which come

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\* Gen. Oliver's Report to the Massachusetts Board of Education.

from deficient self-control. Up to the acceptance of this law, and to the obedience of its requirements, the people must be educated; thus making the necessary education of the race the successful antagonist of its deterioration. This is the application of the well-known Oriental legend, of the contention between Ebony and Topaz—the evil and good Genii—for the soul of the young Prince.

So long as we allow unsanitary conditions within and about dwelling-houses so to dwarf the physical as well as the mental and moral power of the child as to prevent the best development of adults; so long as we suffer diphtheria, scarlet fever, etc., to kill the child, consumption the young man and woman, typhoid the working-man, and other alike preventable diseases to do their evil work upon the ignorantly exposed sufferer; so long as we keep the death-rate as (ignorantly or not) we do keep it, above the possible 15 or even 17 to the 1,000, then is our professed Christian civilization deplorably incomplete, and our individual duty as Christian men and women far short of the demands of the second great commandment of the Divine Law.

Dr. Farr says that civilization is to man what domestication is to the inferior animal, and that both "history and analogy justify us in believing that the higher race admits of development by some of the same means found efficacious in the lower." In man, this is accomplished by a hygienic regimen, complete from infancy and in successive generations, and consequently a gradually increasing development in each, but with a geometrical progression and ultimate attainment which, if immediate, would be wonderful.

In the solution of these hygienic problems, it is sought as far as possible to free the people, for example, from those especial enemies of the human race—hereditary disease, hereditary pauperism, and hereditary criminality; to make Consumption, the Tramp, and the Jukes family (fair exponents of these three preventable evils), no longer, as at present, the natural entail of existing circumstances; to develop in the masses, beginning with the children, not only the moral, religious, and intellectual elements, but especially that athletic power upon which alone the best whole can be built, and which, in an age when all educational means were at the lowest ebb, gave the world the most splendid specimens of manliness. To accomplish the great revolution in society imperfectly outlined in these pages, we must have the aid of a higher power than those simply of interested association and organization. In the

solution, therefore, of this vital problem of the future of the race, and its nearer approach to the possible ideal revealed to us, there is a Divine factor, without whose help all our work will be in vain, but to whose promises, fulfilled in the past and awaiting our acceptance in the future, we may safely look for all needed help in the coming battle for the right.

The statistical investigations of the English Parliamentary Commissions have been made with such care and thoroughness that their results are universally accepted as very close approximations to the exact relations between health and disease. Some of these may well claim our gravest attention:—

It is shown that in London, which is known to be one of the healthiest cities in the world, there is annually an excess of 20,000 deaths, and, in the United Kingdom, of not less than 120,000 deaths, all from causes clearly ascertained to be preventable, and that the serious cases of sickness as clearly preventable are more than ten-fold that number!

Considered as the producers of profit, men are really investments of capital, and as health is the capital of the laboring man, consequently every day of disabling sickness, and every death, is a money-loss. Dr. Farr, in the Report of the Registrar-General, says "that the minimum value of the population of the United Kingdom, men, women, and children, is, upon an average, not less than £159 (\$795) a head. This is the inherent value of them as a productive money-earning race," thus making the loss caused by the 120,000 preventable deaths to amount annually to £19,000,000 (or \$95,000,000). It is also demonstrated that, in addition to the fearful infantile mortality both in city and country, especially in the former, there is, in England and Wales, during the school period of life, annually a preventable excess of 50,000 deaths!

In considering sickness as a most important element of loss, we must again look to the English Parliamentary Papers. In Great Britain there are many organizations under various forms and names, as "Benefit Club," "Friendly Societies," etc., which are practically Health Insurance Companies, embracing many hundreds of thousands of members of all ages. These Societies sustain themselves and make certain weekly payments to their sick and disabled members, by weekly or monthly contributions from each member. The accounts of their Treasurers take note of the time, duration, and character of each case, and thus a "full record is made of all the sickness and injuries of a very large portion of the men,

women, and children in every part and in all the employments of the Kingdom." Dr. Jarvis states that "the government, wishing to measure the productive power of the people, gathered these records, made through many years, and placed them in the hands of the best investigators and calculators to analyze and combine them, and to show the proportion and amount of sickness that fell on male and female children and adults of every age, and in the various occupations and conditions of society. These data thus carefully and accurately gathered, showed that for every death there were two persons constantly sick; that is, for every death there were 730 ( $365 \times 2$ ) days of sickness and disability."\* The same close observations and calculations will give, also, the average value of the product and labor of each individual for the day and year. The loss by each death being given, that of each day of sickness or disability can be very nearly approached, and it is one-third of all these losses that Sanitary Science claims to have demonstrated its power to save.

Life has been compared to a line between two points—that of birth, the point of origin, that of death, the point of termination—the length of the line between being an uncertain quantity under a secret and inexorable law, over which we were ignorantly supposed to have little or no control. The history of the human race has ever testified to the incessant craving of the heart that "our days may be prolonged in the land." The Science of Preventive Medicine justifies this innate desire, by demonstrating that it possesses the power to give a longer extension and a more definite and certain quantity to this line of life. We are told that "the days of our years are three score years and ten," and if we are deprived of the "residue of our years,"

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\* As the nation's wealth consists of the sums of all the estates within its border, the great and the small, deducting all incumbrances, mortgages, debts, etc., so the strength of the State is the sum of all the effective people, deducting all the personal incumbrances—sicknesses, disabilities, and imperfections.

All additions to the physical, moral, or intellectual power of individuals are additions to the energy and productive force and wisdom of the State; and, on the contrary, all deductions from these forces, whether of body or of mind; every sickness, every injury or disability, every impairment of energy, every clouding of the brain from intoxication, etc., take so much from the force of the body-politic. Collective personal gain is public gain, and aggregate personal loss is to the same extent the suffering of the community.—*Dr. Jarvis on Political Economy of Health.*

and do so generally fall far short of that attainment, it will be well for us more carefully to regard that wonderfully-true and perfect sanitary code given to the Jewish nation, and recorded for our instruction and guidance in the Holy Scriptures, and remember that through their obedience to those hygienic laws, "He increased the people greatly, and made them stronger than their enemies," and when He brought them forth out of the land of Egypt, "there was not *one* feeble person among their tribes."

Mr. Edwin Chadwick, in his Address on Health, before the British Science Association, 1877, gives a summary of the chief results obtained in the progress of sanitation in Great Britain; and I can do no better than to quote what is especially applicable to our present needs. He says:

1. That we have gained the power of reducing the sickness and death-rates in most old cities by at least one-third; or, as a rule, of reducing the death-rates in old British urban districts to 16 or 17 in 1,000.

2. That in new districts, on sites apart from old urban sites, we may, with a complete arterial system of water-supply and surface-cleansing—including measures for the prevention of overcrowding—insure reduction of death-rates to less than one-half, or to a mean rate of 10 to 1,000, and the sickness in like proportion.

3. That in well provided and well regulated institutions for children from three to fifteen years of age, we may secure them an immunity from the common children's epidemics, and reduce the death-rates to a mean of 3 in 1,000, or to less by two-thirds of the death-rates prevalent among children of those ages in the general population.

4. That in prisons and places under effective sanitary control, the death-rates (from disease) have been reduced amongst persons from the school ages and upwards to about 3 in 1,000, or to one-third of the death-rates prevalent amongst the general population of the same ages.

5. That to the persons in such institutions immunity may be given as against all ordinary epidemics, typhus, and the eruptive diseases, diarrhœa, and dysentery, which ravage the general population.

6. That amongst the general population, a reduction by full one-half of the diseases of the respiratory organs may be effected by general public sanitation.

He says also that the possibility of all this admits of more abundant proof than he has been able to present in that address; that what has been done has been under conditions that admit of more complete and efficient repetition; and adds, it fully justifies the following recent and most important declaration of the Prime Minister of Great Britain, made in a public address in June, 1877: "I have touched upon the health of the people, and I know there are many who look upon that as an amiable but merely philanthropic subject to dwell upon; but the truth is, that the question is much deeper than it appears upon the surface. The health of the people is really the foundation upon which all their happiness and their power as a state depend. It is quite possible for a kingdom to be inhabited by an able, active population; you may have skillful manufacturers, and you may have a productive agriculture; the arts may flourish, architecture may cover your land with temples and palaces; you may have even material power to defend and support all these acquisitions; you may have arms of precision, and fleets of torpedoes; but if the population of that country is stationary or yearly diminishing; if, while it diminishes in number, it diminishes also in stature and strength, that country is ultimately doomed. And, speaking to those who, I hope, are not ashamed to say that they are proud of the empire to which they belong, and which their ancestors created, I recommend to them by all the means in their power to assist the movement that is now prevalent in the country, for improving the condition of the people by ameliorating the dwellings in which they live. The health of the people is, in my opinion, therefore, the first duty of a statesman."

Mr. Chadwick adds: "Sanitary science has had for its first stage simple ignorance and apathy; next, its stage of empiricism and half-knowledge, in which stage it is very much at present; with the common result of expensive, misfitting, inefficient, and wasteful work; with water distribution which makes good supplies bad, and bad supplies worse; with water carried into houses without the means of removing fouled and waste water, aggravating the evils of damp and of excrement-sodden sites; sewers without adjustment to the house drains; intended arteries without relation to the capillaries of the system, leaving undiminished death-rates, serving to encourage the sinister objection that sanitation is of no avail; and lastly, it has the stage of science, of complete knowledge, of unity, efficiency, and economy, tested by reduced death-rates."

We may well have most sanguine hopes of the future when we reflect that sanitary reform practically is a question of not a quarter of a century old; that the earnest and widespread thoughtfulness upon its necessity and value is far more than a temporary excitement; and as an eminent sanitarian has said, that during this last period, short as it is, more practical work has been done to crush out and prevent disease, and more valuable papers written illustrative of public hygiene, the world over, than since the Christian era began.

The object of this paper is to give such a compendium of State preventive medicine as shall best present to the people its claims upon their confidence and support, and to show, not alone by my own observation and experience, but by the reliable evidence of the highest authorities, what it has done, what it can do, and what the highest public good demands. In support of the argument, I have made free use of Reports, foreign and domestic, and other valuable documentary evidence, not generally accessible.



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